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19. PROTEIN PROFILE OF HAEMOLYMPH FROM *APIS* SPECIES[1]

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Molecular or biochemical considerations are comparatively new tools in honeybee systematics. Though these have been extensively used in the case of *Apis mellifera* (Mestriner 1969; Mestriner and Contel 1972; Sylvester 1986; Lee *et al.* 1989; Sheppard and Berlocher 1989), not much is known about the molecular and biochemical systematic aspects of the Asian honeybee species. It is necessary to integrate morphometric, biological and behavioural data with molecular studies for valid identification of races or geographic ecotypes in case of honeybees. Keeping this in view, studies on biochemical characterizations of honeybee species and populations were carried out.

High hills worker bees of *Apis cerana* were collected from Kinnaur, Himachal Pradesh (2,500 m above msl), and of the plains from the botanical garden, Punjab University, Chandigarh (320 m above msl). *Apis mellifera* workers were taken from the maintained apiary and *Apis dorsata* from natural nesting sites from the Punjab University campus. The haemolymph of worker honeybees was sucked with an auto pipette, by pinching off between two adjacent tergites of the abdomen of the bee. It was then diluted with sample buffer in the ratio of 1:1. For protein profiling, standard technique of SDS-PAGE (Laemmli 1970) was employed.

During the present studies, nine protein fractions were

Table 1: Protein fractions in haemolymph of *Apis* species

	Standard		*A. cerana* of high hills		*A. cerana* of plains		*A. mellifera*		*A. dorsata*	
Sr. No.	Mol. Wt. (kD)	Rf. Values	Mol. Wt. (kD)	Rf. Values	Mol. Wt. (kD)	Rf. Values	Mol. Wt. (kD)	Rf. Values	Mol. Wt. (kD)	Rf. Values
1.	480	0.2765	480	0.2765	4400	0.04255	210	0.36	250	0.34
2.	67	0.48	300	0.3101	3000	0.085	41.9	0.53	67	0.48
3.	45	0.51	96	0.4468	2000	0.1276	45	0.51	45	0.51
4.	24	0.5951	67	0.48	1650	0.1489	24	0.5951	24	0.5951
5.	18	0.6170	45	0.51	1050	0.17	-	-	-	-
6.	-	-	29	0.57	400	0.29	-	-	-	-
7.	-	-	-	-	67	0.48	-	-	-	-
8.	-	-	-	-	45	0.51	-	-	-	-
9.	-	-	-	-	41.9	0.53	-	-	-	-

identified in the haemolymph of *Apis cerana* of the plains while that of the high hills showed six protein fractions. Only one fraction corresponding to molecular weight 67 kD was shared between them, and was also present in *A. dorsata*, but absent in *A. mellifera* (Table 1), suggesting that it is characteristic of Asian species. The protein profile of populations from high hills and plains of *A. cerana* was found to be very different. This is in accordance with the suggestion of Aseo and Laude (1993), that electrophoresis data has the potential for the identification of sub-species within each species and as a marker for population structures.

The presence of a larger number of protein fractions in *A. cerana* of plains is perhaps indicative of the influence of floral food sources on the haemolymph composition. The botanical garden of Panjab University, from where these bees were collected, was blooming with spring flora, including ornamentals and fruit trees such as *Prunus amygdalus*, *Prunus padam*, *Prunus domestica*. Abdel and Wahab (1970) also observed the effect of the host plant on the haemolymph composition of *Spodoptera*.

Kumar and Kamal (1999) and Kamal (2000) studied the protein composition of hypopharyngeal glands in *A. cerana* and *A. mellifera*, and also compared the protein fractions in the royal jelly. Kamal (2000) suggested a systematic significance of the variations found in these.

ACKNOWLEDGEMENT

We thank the Chairman, Department of Zoology, Punjab University, Chandigarh for the research facilities provided.

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20. A PREY-PREDATOR LINK BETWEEN THE ROCK BEE *APIS DORSATA* AND THE FALSE VAMPIRE BAT *MEGADERMA LYRA* GEOFFROY BASED ON THEIR CIRCADIAN RHYTHMS[1]

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During observations, in March and April 1997, at the School of Life Sciences, Jawaharlal Nehru University, New Delhi, we found Rock Bee *Apis dorsata* hives hanging from the edge of the sunshade of the fourth floor of the school building. In the evenings, we would observe the last two mass flights, (Kastberger *et al.* 1996), of the bees, for around 5 and 10 minutes. The first mass flight occurred just before sunset, and the second during sunset. Two to three minutes before the mass flight, the False Vampire Bats (*Megaderma lyra* Geoffroy) would appear and circle around the beehive ready to catch the flying bees.

Samples of both the mass flight of bees were collected (sample sizes 109, 57 and 44), using a butterfly net (attached with a long rod). The bees caught were chilled to make them unconscious and the number of workers and drones noted. Analysis of samples confirms that 78.5% of the bees were drones. The sample of an earlier mass flight showed only 4.3% drones (sample sizes 40, 38 and 37). The circadian